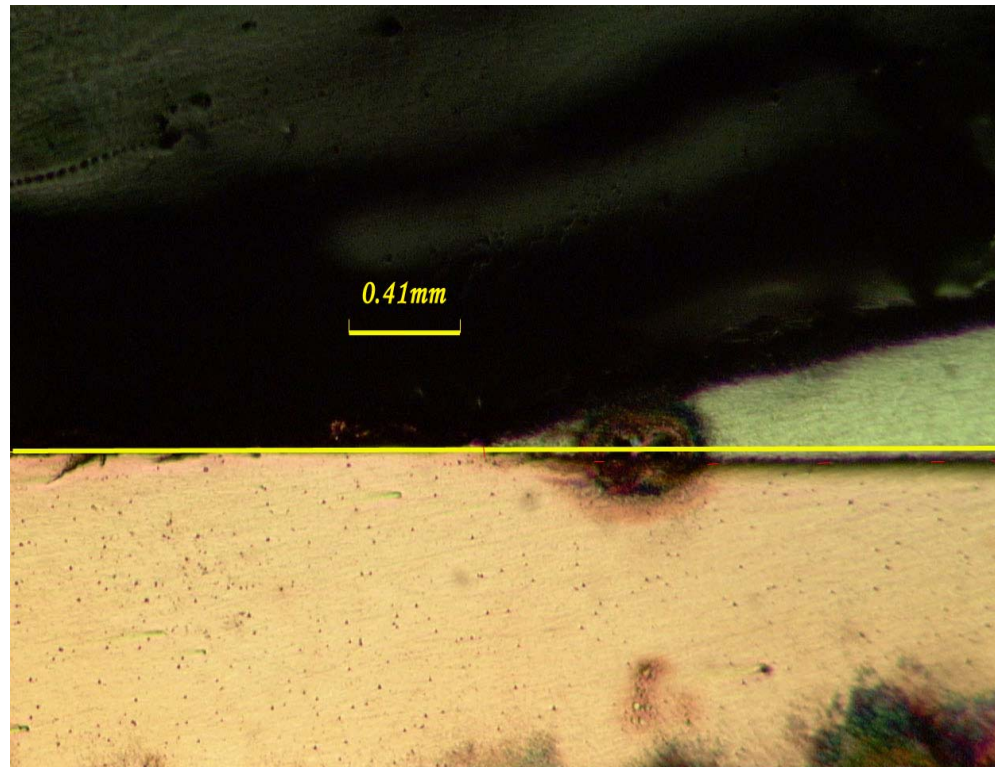


Modeling Formation of Microstructure of Intermetallic Compounds During Soldering.

Alex Umantsev, Fayetteville State University, DMR-0244398

Soldering is surface joining technology used in many different industries e.g., electronics. When molten solder (usually tin-based) comes into contact with a solid substrate, a thin layer of intermetallic compound with a complicated scalloped morphology is formed. The goal of this project is to find physical reasons for such morphology and to simulate the process of soldering. To achieve the first goal we study initial stages of soldering when the intermetallic compound layer just appears between the solder and substrate. Our experiments show that as the leading edge of the compound grows into the substrate, the solder dissolves the newly formed compound on the trailing edge.

On the picture below the yellow line is the initial divider between the solder and substrate. The dark line under the initial divider is the intermetallic compound. The eye-looking spots are voids filled with flux.



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Education and Outreach:

Two FSU undergraduates contribute to this work. Mr. Richard Lord (US Army Veteran) is conducting soldering experiments using facilities on FSU campus and at NCSU in Raleigh. At present he is enrolled in Chem. Research class with the PI as his advisor. Mr. Lord is expected to graduate in 2004 with major in Biology and minor in Chemistry. Ms. Eileen Scot (African-American female) is doing computer simulations, data processing and visualization. She is expected to graduate in 2005 with major in Computer Science and minor in Business. In the summer of 2003 their work on the project was supported by the REU Supplement to the Grant.

